

1.0 INTRODUCTION

1.1 BACKGROUND AND PURPOSE

The Steering Committee for the Bay-Delta Conservation Plan (BDCP) is developing a comprehensive conservation plan for the Sacramento and San Joaquin Delta pursuant to a planning agreement that was executed on October 6, 2006 (BDCP 2006). The BDCP planning area is the legal Delta (Figure 1-1). In first half of 2007, the Steering Committee developed a list of ten conceptual conservation strategies, evaluated those strategies, and shortened that list to four Conservation Strategy Options (Options). Those four Options are evaluated in this report. The Steering Committee is intent on further narrowing the remaining Options to a single Option (derived from one or more of the evaluated Options) that will be carried forward into a detailed conservation planning process over the course of the next year. The chosen Option will serve as the nucleus for the larger conservation plan and other major elements of the strategy will be formulated around it. This larger, more comprehensive conservation plan will then be evaluated through a formal, public environmental review process under the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA).

The purpose of this report is to evaluate the four Options in order to assist the Steering Committee in identifying which Option to carry forward into the planning process. This report describes how each of the four Options performs with respect to seventeen evaluation criteria identified by the Steering Committee for this purpose. It should be emphasized that this evaluation provides only an initial assessment of the relative performance of each of the four Options as described herein. It is likely that some elements of the selected Option will need to be refined further in light of information contained in this report and elsewhere. The Steering Committee may over the course of the fall elect to select one of the four Options to carry forward, or it may choose instead to modify or otherwise refine one of the Options and carry that modified Option into the planning process.

1.2 APPROACH TO EVALUATION

A summary of the approach to the Options evaluation is provide here, with a more detailed description of the approach provided in Section 2, "Evaluation Methods." The approach to this evaluation focused on the comparative ability of each Option to address each of the evaluation criteria. The four Options center around two main elements: the structural conveyance system and the location of habitat restoration opportunities. Using performance metrics, the evaluation identifies how the differing structural conveyance system and the habitat restoration opportunities among the Options distinguish the Options from each other. The Options are describe in Section 1.3, "Descriptions of Conservation Strategy Options."

The seventeen evaluation criteria (see Section 1.5 "Evaluation Criteria" for full text of criteria) are grouped into four categories:

- biological criteria,
- planning criteria,

- flexibility/durability/sustainability criteria, and
- other resource impact criteria.

Specific metrics for use in the evaluation of each criterion were developed and scaling of the metrics, quantitatively or qualitatively, was used to score or rank the Options against each other or against base conditions (see Section 1.4 “Base Conditions” for the definition of base conditions used). The evaluation criteria were designed to allow a comparison of the Options at this stage of the process. There are other criteria and issues, not included here because they did not appear to differentiate the Options, that will need to be addressed in the future as the larger strategy is developed. In addition, the evaluation makes some assumptions that are acceptable at this level of analysis but that will need to be further evaluated as the larger strategy is developed. For example, in the biological evaluation, it is assumed that habitat restoration can be effective in alleviating some stressors on the species. This assumption should be valid for this coarse analysis, but as planning for habitat restoration proceeds, more work will be needed on those specific stressors and the habitat conditions needed to address them.

1.2.1 Biological Criteria

For purposes of evaluating the relative ability of each of the four Options to meet the biological criteria, this report assesses the relative performance of each Option on a species-by-species basis. At present, the BDCP has identified nine potentially covered species:

- delta smelt,
- longfin smelt,
- winter-run Chinook salmon,
- spring-run Chinook salmon,
- fall- and late-fall-run Chinook salmon,
- Central Valley steelhead,
- green sturgeon,
- white sturgeon, and
- Sacramento splittail.

The comparative evaluation provided in this report is based on existing scientific information about environmental stressors affecting the nine covered fish species and Delta ecosystem processes important to supporting these species. The evaluation is largely qualitative, based on the best professional judgment of individuals who are knowledgeable about the covered species, the complex hydrology of the Delta, and the interplay of that hydrology with the ecological requirements of the individual species of fish. It includes the use of preliminary, coarse-level hydrodynamic modeling applying a broad range of input parameters to the four

Options to enable a comparison of the Options' relative ability to provide flow and water quality conditions that benefit the species. For the purpose of evaluating the operating flexibility of each Option, hydrodynamic models CALSIM II and DSM 2 were applied using input parameters that spanned a range of potential operations for each Option. The results of these models were interpreted for anticipated effects on each fish species based on published and unpublished literature and best professional judgment. Each Option's effect on each species is based on an assessment of how the Option affects the species' stressors and the degree of those effects is compared among the Options using the metrics established for each of the biological criteria.

While the Options do not include any specific locations for habitat restoration, the evaluation also identifies the relative opportunities and constraints of each Option for physical restoration of high functioning habitat that would improve ecological conditions for covered species.

1.2.2 Planning Criteria

The planning criteria focus on the ability of each Option to achieve the BDCP planning goals. This comparative evaluation is based on the results of hydrodynamic modeling to estimate the ability of each Option to achieve water supply goals; a cost comparison of both initial construction and long-term costs; and the relative practicability of the implementation.

1.2.3 Flexibility/durability/sustainability Criteria

These criteria address the flexibility, durability, and sustainability of each Option. These criteria focus primarily on the long-term ability of each Option to meet conservation and planning goals in the face of changing environmental conditions and expanding ecological knowledge. The report uses information from preliminary results of Delta Risk Management Strategy (DRMS) studies in evaluating the durability of the Options in response to catastrophic events in the Delta and long-term climate change.

1.2.4 Other Resource Impacts Criteria

The other resource impacts criteria focus on the unintended adverse effects of implementing each Option on the human environment and on other biological resources within and outside the Delta. This evaluation is based on prior environmental studies in the Delta that have evaluated actions similar to the four Options and on the outputs of the hydrodynamic modeling.

1.2.5 Other Important Stressors and Conservation Elements

A number of potentially important ecological stressors on fish are not directly addressed by the Options as they are presently defined such as toxics, predation, competition, harvest, and turbidity. While the Options may indirectly address these stressors, there are many conservation elements that could be added to the Options that would more fully address them. These important stressors and the conservation elements that could address them and benefit specific covered species are discussed in Section 8 of the evaluation. Conservation elements addressing such stressors may be equally applicable under all Options and, therefore, do not serve to distinguish among the Options in the evaluation. Conservation elements addressing

these other stressors may become important components of the larger conservation strategy as it is further developed.

1.3 DESCRIPTIONS OF CONSERVATION STRATEGY OPTIONS

The four Options evaluated in the report were developed by the Steering Committee around two key components:

- Conveyance – the structural approach to conveyance of water to meet the goals for conservation of covered species and water supply reliability.
- Habitat restoration – the general type and location of habitat restoration opportunities in the Delta and in adjacent Suisun Marsh to address covered species conservation

The Options presented here represent a range of conveyance and habitat restoration approaches developed for the purpose of comparative evaluation. All of the Options could be refined, modified, or expanded to improve their performance in addressing the evaluation criteria.

1.3.1 Conservation Strategy Option 1: Existing Through-Delta Conveyance

Option 1 would involve the use of existing conveyance and pump facilities with operations focused on reducing take at the export facilities and improvement of hydrologic conditions for fish in the northern and western Delta; physical habitat restoration would be focused in the north and west Delta and Suisun Marsh (Figure 1-2). The estimated area available for habitat restoration encompasses approximately 28% of the BDCP planning area (i.e., the legal Delta).

Facilities

Option 1 would use the existing C.W. “Bill” Jones Pumping Plant (Jones Pumping Plant) of the Central Valley Project (CVP) and Harvey O. Banks Delta Pumping Plant (Banks Pumping Plant) of the State Water Project (SWP) as export facilities in the South Delta, including continued use of Clifton Court Forebay.

Water operations

Water operations for Option 1 have not been characterized at this time. For the purpose of this evaluation, the Science Applications International Corporation (SAIC) consulting team developed and used key input parameters to the CALSIM II and DSM2 hydrologic models to assess the potential of this Option to meet specific biological and planning criteria. Two sets of parameter values were used to bracket a broad range of potential hydrologic and hydrodynamic conditions that could be associated with water operations under Option 1 (see Section 2.2). The operational inputs were developed solely for the purpose of this evaluation and do not represent any specific proposal for operations from any member of the Steering Committee or other entity. Model parameters and parameter values used to capture a range of water operations under Option 1 are presented in Appendices A and B.

1 *Habitat restoration and enhancement*

2 Based on anticipated hydrodynamic conditions within Delta channels associated with exports
3 from the existing SWP and CVP export facilities, opportunities for habitat restoration and
4 enhancement have been primarily identified within the northern and western regions of the
5 Delta (Figure 1-2). Although water operations for exports would not preclude habitat
6 restoration and enhancement within the central or southern Delta, potential biological benefits
7 are anticipated to be lower due to increased water velocities and reduced residence time, as well
8 as increased vulnerability to entrainment at SWP and CVP export facilities, when compared to
9 enhanced habitat located further away from the potential zone of export influence. Potential
10 habitat restoration and enhancement opportunities association with Option 1 could include:

- 11 • Increase spawning habitat for salmon and steelhead within the upstream reaches of the
12 mainstem of the Sacramento River and major tributaries.
- 13 • Modify the existing channel configuration and levees on the mainstem of the
14 Sacramento River to increase the frequency and duration of seasonal floodplain
15 inundation over a wider range of flow conditions than currently exists.
- 16 • Provide an alternative migration route for Chinook salmon, steelhead, and other
17 resident and migratory fish within the northern region of the Delta that would bypass
18 the Delta Cross Channel and Georgiana Slough.
- 19 • Increase habitat diversity and complexity and food production for delta smelt and other
20 resident fish species within the northern Delta by enhancing the area of freshwater tidal
21 wetlands.
- 22 • Improve the hydraulic residence time and tidal exchange within sloughs and channels
23 and consider relocating or modifying the Barker Slough pumping plant, as needed.
- 24 • Provide connectivity by securing a wildlife corridor between high-value habitat within
25 the northern region of the Delta and Suisun Marsh.
- 26 • Increase the availability of brackish and freshwater tidal habitat in Suisun Marsh,
27 including dendritic channels within both intertidal and subtidal areas by reconfiguring
28 levees and water management along the channel margins adjacent to Suisun Bay and
29 along interior channels.
- 30 • Protect and promote enhancements to tidal wetlands within the area adjacent to
31 Sherman Lake.
- 32 • Construct interior levees, thus re-establishing tidal inundation and promoting tidal
33 wetland development within the western portion of the Delta and Suisun Bay.
- 34 • Construct interior levees to allow tidal inundation along channel margins of the lower
35 Sacramento River.

- 1 • Provide setback levees and other modifications to the channel adjacent to Suisun Bay
2 and the lower Sacramento River to allow tidal inundation and promote tidal wetland
3 vegetation colonization.
- 4 • Implement a management program at Clifton Court Forebay that may include actions
5 such as predator removal, modification of radial gate operations, and adding facilities to
6 promote fish passage from the radial gate to the salvage facility.
- 7 • Improve the collection, handling, transport, and release facilities and procedures at both
8 the SWP and CVP salvage facilities.

9 Under Option 1, opportunities to establish more natural hydrologic conditions would primarily
10 be limited to the region located west of the confluence of the Sacramento and San Joaquin
11 Rivers.

12 **1.3.2 Conservation Strategy Option 2: Improved Through-Delta Conveyance**

13 Option 2 would involve improvement of through-Delta conveyance by (1) constructing
14 operable barriers and levee improvements along Middle River; (2) constructing operable
15 barriers on the San Joaquin and Old Rivers; (3) separating water supply conveyance flows from
16 San Joaquin River flows with a siphon (and pump facility) connecting the Victoria Canal and
17 Clifton Court Forebay; (4) operations focused on reducing take at the export facilities and
18 improvement of hydrologic conditions for fish in the northern, western, central, and southern
19 Delta; and (5) physical habitat restoration focused in the north, west, central, and south Delta
20 and Suisun Marsh (Figure 1-3). The estimated area available for habitat restoration encompasses
21 approximately 35% of the BDCP planning area and is the same area that is available for
22 restoration under Option 3.

23 That the hydrodynamic modeling results for Option 2 indicated that a gravity siphon would not
24 convey water at a sufficient rate to meet supply goals and, therefore, a low-head pump facility
25 was assumed to be included at the siphon in the evaluation of Option 2. The addition of a
26 pump facility to Option 2 allows for a comparative evaluation of all Options on an equal basis
27 in which each Option is capable of achieving the planning objectives stated in the BDCP
28 Planning Agreement (BDCP 2006).

29 ***Facilities***

30 The new facilities under Option 2 are presented in Figure 1-3 and include:

- 31 • Operable physical channel barriers near the confluence of Middle River and the
32 following channels:
 - 33 ○ Woodward Canal,
 - 34 ○ Railroad Cut, and
 - 35 ○ Connection Slough.

- Operable physical channel barriers on the Old River near the confluence with the San Joaquin River and on the San Joaquin River near the head of Old River.
- Siphon with low-head pump facility connecting Victoria Canal with Clifton Court Forebay under Old River, thus allowing direct conveyance of Middle River water through Victoria Canal to Clifton Court Forebay and the SWP pumping facility.
- Reinforcement of levees along Victoria Canal and along Middle River from Medford Island to Victoria Canal.
- Hydraulic intertie between Clifton Court Forebay and the CVP intake channel in the south Delta.

Water operations

Water operations for Option 2 have not been characterized at this time. For the purpose of this evaluation, key input parameters to the CALSIM II and DSM2 hydrologic models were developed and used for the purpose of assessing the potential of this Option to meet specific biological and planning criteria. Two sets of parameter values were used to bracket a broad range of potential hydrologic and hydrodynamic conditions that could be associated with water operations under Option 2 (see Section 2.2). The operational inputs were developed solely for the purpose of this evaluation and do not represent any specific proposal for operations from any member of the Steering Committee or other entity. Model parameters and parameter values used to capture a range of water operations under Option 2 are presented in Appendices A and B.

Habitat restoration and enhancement

Based on a consideration of the tidal hydrodynamics that would be anticipated in the Delta under Option 2, all of the habitat restoration and enhancement opportunities identified under Option 1 would be available under Option 2. Under Option 2, opportunities for habitat restoration and enhancement would be expanded to include the central and southern regions of the Delta, as shown in Figure 1-3. In addition, a siphon would be used to convey water from Victoria Canal to the export facilities without obstructing the Old River channel. The siphon would provide habitat restoration and enhancement opportunities within the San Joaquin River bypass and mainstem San Joaquin River (Figure 1-3). In addition to the features identified in Option 1, additional habitat enhancement under Option 2 may include:

- Increase habitat diversity and complexity by increasing the availability of tidally inundated shallow water wetland habitat through setback levees or the creation of additional berms associated with the channels west of the proposed Middle River barriers.
- Increase the availability of seasonal floodplain habitat inundation as well as tidal inundation along channels in the southern Delta.

Under Option 2, opportunities to establish more natural hydrologic conditions would be limited to the region located west of Middle River (Figure 1-3).

1.3.3 Conservation Strategy Option 3: Dual Conveyance

Option 3 would involve dual conveyance facilities and physical and operational habitat restoration and enhancement. Conveyance would be via: (1) a peripheral aqueduct with an intake on the Sacramento River and isolated connection at the SWP/CVP pump facilities; (2) an improved through-Delta conveyance with operable barriers on connecting channels along Middle River and on the San Joaquin and Old Rivers and (3) separated water supply flows from San Joaquin River flows by a siphon. Operations would focus on the use of the flexibility of dual conveyances to reduce take of covered fish species at the export facilities and improve hydrologic conditions for covered fish in the northern, western, central, and southern Delta. Physical habitat restoration and enhancement would be focused in the north, west, central, and south Delta and Suisun Marsh (Figure 1-4). The estimated area available for habitat restoration encompasses approximately 35% of the BDCP planning area and is the same area that is available for restoration under Option 2.

Facilities

The new facilities under Option 3 are presented in Figure 1-4 and include:

- Operable physical channel barriers near the confluence of Middle River and the following channels:
 - Woodward Canal,
 - Railroad Cut, and
 - Connection Slough.
- Operable physical channel barriers on the Old River near the confluence with the San Joaquin River and on the San Joaquin River near the head of Old River.
- Siphon under Old River connecting Victoria Canal with Clifton Court Forebay, thus allowing direct conveyance of Middle River water through Victoria Canal to Clifton Court Forebay and the SWP pumping facility.
- An intake facility with state-of-the-art positive barrier fish screens on the Sacramento River near Hood or Clarksburg.
- Peripheral aqueduct and associated appurtenant facilities (i.e., pumping plant and siphons) that would traverse from the new intake facility along the Sacramento River southerly along an alignment in the East Delta adjacent to, and west of, Interstate 5. The Peripheral aqueduct would terminate south of Clifton Court Forebay and tie into the existing SWP and CVP facilities.

Under this Option, the existing export facilities (Jones Pumping Plant and Banks Pumping Plant) in the south Delta may be used in addition to the new intake facility on the Sacramento River.

Water operations

Water operations for Option 3 have not been characterized at this time. For the purpose of this evaluation, key input parameters to the CALSIM II and DSM2 hydrologic models were developed and used for the purpose of assessing the potential of this Option to meet specific biological and planning criteria. Two sets of parameter values were used to bracket a broad range of potential hydrologic and hydrodynamic conditions that could be associated with water operations under Option 3 (see Section 2.2). The operational inputs were developed solely for the purpose of this evaluation and do not represent any specific proposal for operations from any member of the Steering Committee or other entity. Model parameters and parameter values used to capture a range of water operations under Option 3 are presented in Appendices A and B.

Habitat restoration and enhancement

Because Option 3 would include the same barriers as Option 2 and use the Middle River corridor for water conveyance, habitat restoration and enhancement opportunities under Option 3 (Figure 1-4) are anticipated to be comparable to habitat opportunities identified and described for Option 2 (Figure 1-3). To the extent that water exported through the peripheral aqueduct from the Sacramento River at Hood or Clarksburg, habitat restoration and enhancement opportunities could be extended to other areas of the northern Delta and eastern Delta tributaries and sloughs. As a result of the uncertainties regarding dual conveyance facility operations, the primary focus on habitat restoration and enhancement opportunities under Option 3 would be the same as Option 2 in the northern and western portions of the Delta and central and southern Delta channels located to the west of the barriers on Middle River (Figure 1-4).

Under Option 3, opportunities to establish more natural hydrologic conditions would, for the most part, be limited to the region west of Middle River (Figure 1-4).

1.3.4 Conservation Strategy Option 4: Peripheral Aqueduct

Option 4 would involve construction of a peripheral aqueduct with an intake on the Sacramento River and isolated connection at the SWP and CVP pump facilities. Operations would provide the flexibility to improve hydrologic conditions for covered fish species throughout the Delta and to physically restore and enhance habitat opportunistically throughout the Delta and Suisun Marsh (Figure 1-5). The estimated area available for habitat restoration encompasses approximately 75% of the BDCP planning area.

Facilities

The new facilities under Option 4 are presented in Figure 1-5 and include:

- An intake facility with state-of-the-art positive barrier fish screens on the Sacramento River near Hood or Clarksburg.
- A peripheral aqueduct and associated appurtenant facilities (i.e., pumping plant and siphons) that would traverse from the new intake facility along the Sacramento River

southerly along an alignment in the East Delta adjacent to, and west of, Interstate 5. The conveyance canal would terminate south of Clifton Court Forebay and tie into the existing SWP and CVP facilities.

Water operations

Water operations for Option 4 have not been characterized at this time. For the purpose of this evaluation, key input parameters to the CALSIM II and DSM2 hydrologic models were developed and used for the purpose of assessing the potential of this Option to meet specific biological and planning criteria. Two sets of parameter values were used to bracket a broad range of potential hydrologic and hydrodynamic conditions that could be associated with water operations under Option 4 (see Section 2.2). The operational inputs were developed solely for the purpose of this evaluation and do not represent any specific proposal for operations from any member of the Steering Committee or other entity. Model parameters and parameter values used to capture a range of water operations under Option 4 are presented in Appendices A and B.

Habitat restoration and enhancement

Under Option 4, all of the SWP and CVP exports would occur through a state-of-the-art positive barrier fish screen located on the Sacramento River near Hood or Clarksburg. Hydrodynamic conditions within the Delta would be expected to have a net westerly flow, thus restoring more natural Delta conditions (Figure 1-5). Under the export and Delta hydrologic conditions expected to occur under Option 4, opportunities for habitat restoration and enhancement would include most of the Delta (Figure 1-5). Habitat restoration and enhancement opportunities under Option 4 would encompass all opportunities identified under Options 1, 2, and 3. Additionally, Option 4 would support opportunities to create floodplains, seasonal bypasses, corridors for migration, and shallow tidally inundated wetland areas extended geographically eastward to approximately Interstate 5.

Under Option 4, opportunities to establish more natural hydrologic conditions would occur throughout the Delta extending eastward to approximately Interstate 5 (Figure 1-5).

1.4 BASE CONDITIONS

Base Delta conditions are used in this evaluation to provide a common basis of comparison from which to assess the performance of each Option to each relevant criterion. Base conditions for the biological and physical environment are defined as the present state of the Delta ecosystem and supporting processes, including the present distribution and abundance of the covered fish species as of the most recent monitoring and research information available for the specific resource. For the Delta hydrodynamics used in the hydrodynamic modeling, base conditions for the Delta are defined as ongoing operation of existing facilities, current year water supply demands, and existing regulatory constraints as outlined in the State Water Resources Control Board (SWRCB) Water Rights Decision 1641 (D-1641) and the most recent U. S. Fish and Wildlife Service (FWS) and National Marine Fisheries Service (NMFS) biological opinions on coordinated operations of CVP and SWP and the Operating Criteria and Plan (OCAP) (SWRCB 1999; FWS 2005; NMFS 2004).

No attempt was made to identify a Delta environmental baseline under federal or state environmental regulations for use in this evaluation of the Options. The comparative evaluation of Options is an early screening-level planning process that does not require the level of detail or regulatory specificity that later, more detailed BDCP effects analyses will include.

1.5 EVALUATION CRITERIA

The evaluation of the four Options is based on the application of seventeen evaluation criteria adopted by the BDCP Steering Committee. The methods, metrics, and scales used to apply each of these criteria are presented in Section 2, "Evaluation Methods." These criteria are the same as those that were used to evaluate the BDCP Conservation Element Bundles (BDCP 2007). The criteria were developed based on the BDCP Planning Agreement planning goals (Section 3) and preliminary conservation objectives (Section 6), the draft BDCP conservation objectives approved by the BDCP Steering Committee, and previously developed criteria for evaluating approaches to conserving the Delta (Mount et al. 2006). The criteria are classified into four categories: biological, planning, flexibility/durability/sustainability, and other resource impacts.

Biological Criteria

1. Relative degree to which the Option would reduce species mortality attributable to non-natural mortality sources to enhance production (reproduction, growth, and survival), abundance, and distribution for each of the covered fish species (BDCP Conservation Objective).
2. Relative degree to which the Option would provide water quality and flow conditions necessary to enhance production (reproduction, growth, and survival), abundance, and distribution for each of the covered fish species (BDCP Conservation Objective).
3. Relative degree to which the Option would increase habitat quality, quantity, accessibility, and diversity to enhance and sustain production (reproduction, growth, and survival), abundance, and distribution, and to improve the resiliency of each of the covered species' populations to environmental change and variable hydrology (BDCP Conservation Objective).
4. Relative degree to which the Option would increase food quality, quantity, and accessibility (e.g., phytoplankton, zooplankton, macro-invertebrates, and forage fish) to enhance production (reproduction, growth, and survival) and abundance for each of the covered fish species (BDCP Conservation Objective).
5. Relative degree to which the Option would reduce the abundance of non-native competitors and predators to increase native species production (reproduction, growth, and survival), abundance, and distribution for each of the covered fish species (BDCP Conservation Objective).
6. Relative degree to which the Option improves ecosystem processes in the BDCP planning area to support aquatic and associated habitats (BDCP Conservation Objective).

7. Relative degree to which the Option can be implemented within a timeframe to meet the near-term needs of each covered fish species (assumed following BDCP authorization).

Planning Criteria

8. Relative degree to which the Option allows covered activities to be implemented in a way that meets the goals and purposes of those activities.
9. The relative feasibility and practicability of the Option, including the ability to fund, engineer, and implement.
10. Relative costs (including infrastructure, operations, and management) associated with implementing the Option.

Flexibility/Durability/Sustainability Criteria

11. Relative degree to which the Option will be able to withstand the effects of climate change (e.g., sea level rise and changes in runoff), variable hydrology, seismic events, subsidence of Delta islands, and other large-scale changes to the Delta.
12. Relative degree to which the Option could improve ecosystem processes that support the long-term needs of each of the covered species and their habitats with minimal future input of resources.
13. Relative degree to which the Option can be adapted to address the needs of covered fish species over time.
14. Relative degree of reversibility of the Option once implemented.

Other Resource Impacts Criteria

15. Relative degree to which the Option avoids impacts on the distribution and abundance of other native species in the BDCP planning area.
16. Relative degree to which the Option avoids impacts on the human environment.
17. Relative degree the Option avoids impacts on sensitive species and habitats in areas outside of the BDCP planning area.

1.6 REPORT ORGANIZATION

The sections and content of this Options Evaluation Report are described below:

Section 1, "Introduction," describes the background and purpose this report and the approach to the evaluation, provides descriptions of the conservation strategy options, lists the current conditions of the site, and presents the evaluation criteria used to compare the Options.

1 Section 2, "Evaluation Methods," describes the species stressors and hydrodynamic modeling
2 methods and results that were used to evaluate the Options and the metrics and assumptions
3 used to evaluate the performance of each Option for each evaluation criterion.

4 Section 3, "Conservation Strategy Option 1 Evaluation," presents the evaluation results for
5 Option 1 by evaluation criteria category.

6 Section 4, "Conservation Strategy Option 2 Evaluation," presents the evaluation results for
7 Option 2 by evaluation criteria category.

8 Section 5, "Conservation Strategy Option 3 Evaluation," presents the evaluation results for
9 Option 3 by evaluation criteria category.

10 Section 6, "Conservation Strategy Option 4 Evaluation," presents the evaluation results for
11 Option 4 by evaluation criteria category.

12 Section 7, "Comparison of the Options," compares the relative performance of each of the
13 Options based on the metrics and scales established for each of the evaluation criterion.

14 Section 8, "Opportunities for Conservation Elements Available Under all Options," describes
15 additional conservation elements that could be implemented within the planning area under all
16 of the Options and identifies species stressors that are not addressed by the Options, but which
17 could be addressed by additional conservation elements implemented inside or outside of the
18 planning area.

19 Section 9, "References," lists the references and personal communications cited in this Options
20 Evaluation Report.

21 Figure 1-1 identifies features in of the BDCP planning area that are mentioned in this report.
22 The contents of appendices to this Options Evaluation Report are described below:

23 Appendix A, "Description of Hydrologic/Hydrodynamic Analytical Tools and Summary of
24 Modeling Results," describes the CALSIMII and DSM2 models used in the evaluation and
25 summarizes the modeling results.

26 Appendix B, "Flow Parameters and Parameter Values used in CALSIM2 and DMS2 Modeling
27 of the Options," presents the range of flow parameter values used in the CALSIM2 and DMS2
28 models.

29 Appendix C, "Covered Fish Species Stressors," presents the highly and moderately important
30 stressors for each of the covered fish species and the process used to identify the stressors.

31 Appendix D, "CALSIM2 and DMS2 Modeling Results for Option 1," presents the
32 hydrodynamic modeling results for Option 1.

33 Appendix E, "CALSIM2 and DMS2 Modeling Results for Option 2," presents the hydrodynamic
34 modeling results for Option 2 as originally described with a gravity siphon.

- 1 Appendix F, "CALSIM2 and DMS2 Modeling Results for Option 3," presents the hydrodynamic
2 modeling results for Option 3.
- 3 Appendix G, "CALSIM2 and DMS2 Modeling Results for Option 4," presents the
4 hydrodynamic modeling results for Option 4.
- 5 Appendix H, "Options Scores by Evaluation Criteria Metrics," presents the evaluation scores for
6 each Option by metrics used to assess Option performance relative to each of the evaluation
7 criterion.

FIGURES

This page left blank intentionally.

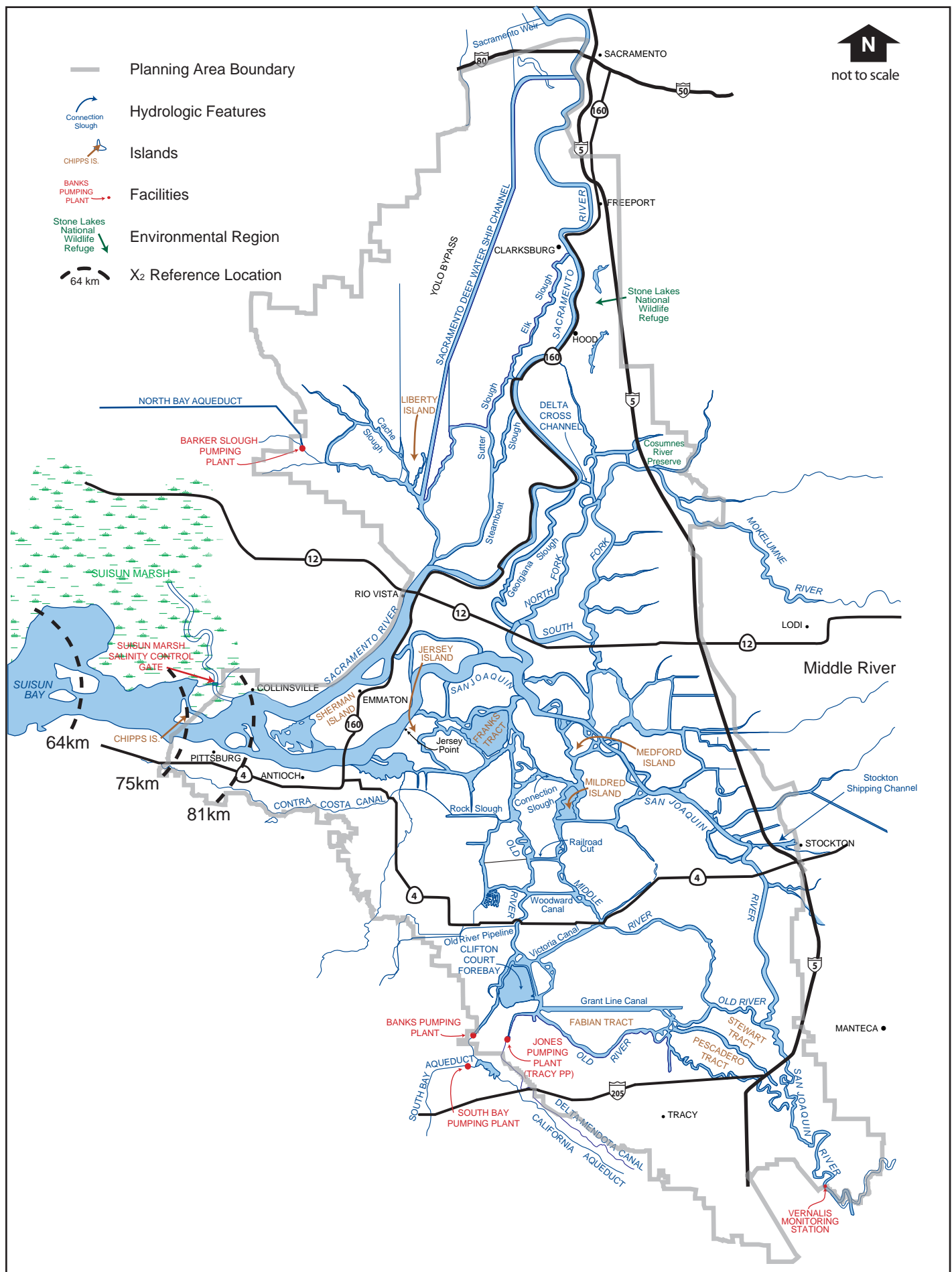


Figure 1-1. Locator Map of Planning Area with Key Features Mentioned in Text

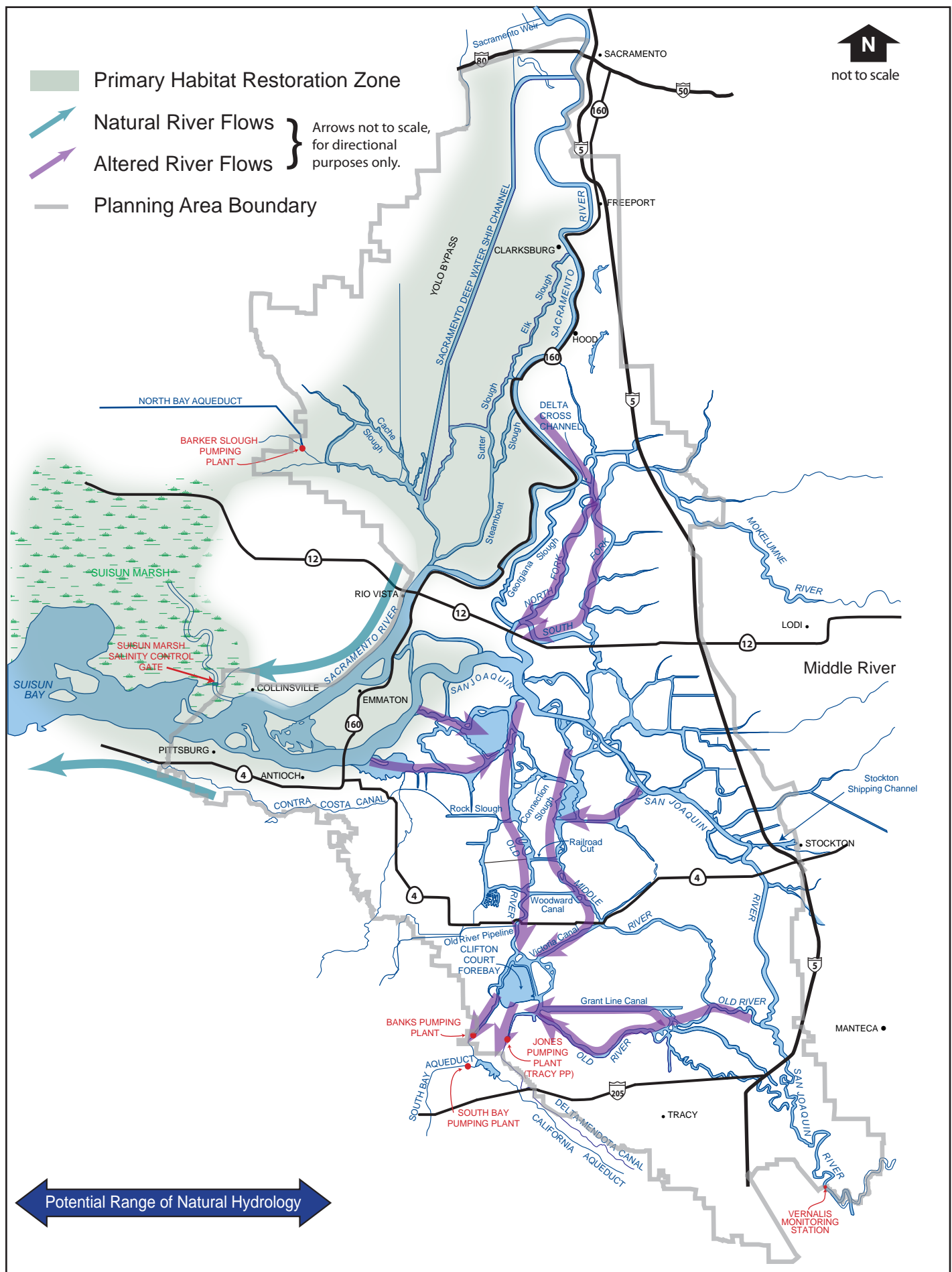
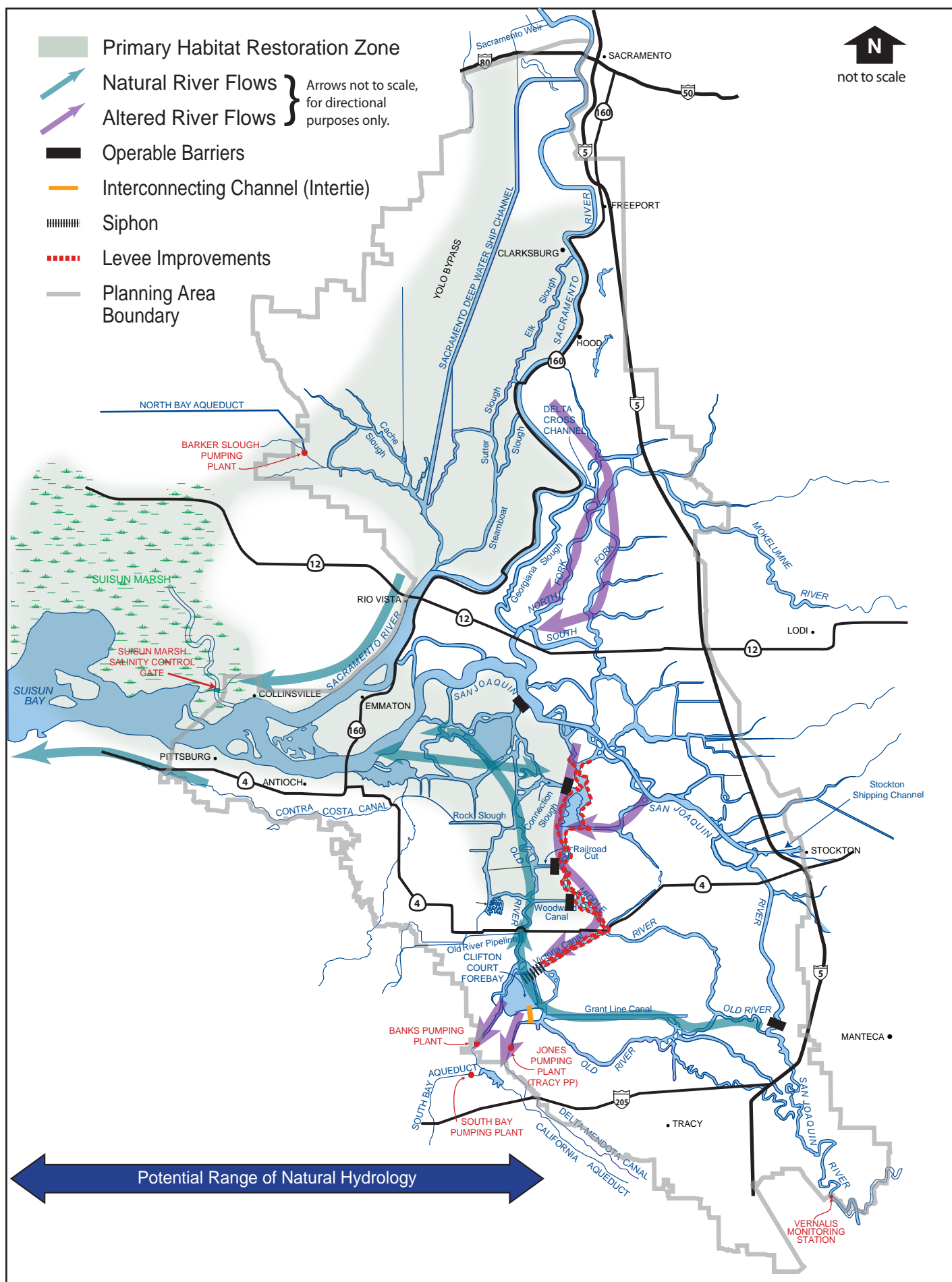


Figure 1-2. Conservation Strategy Option 1



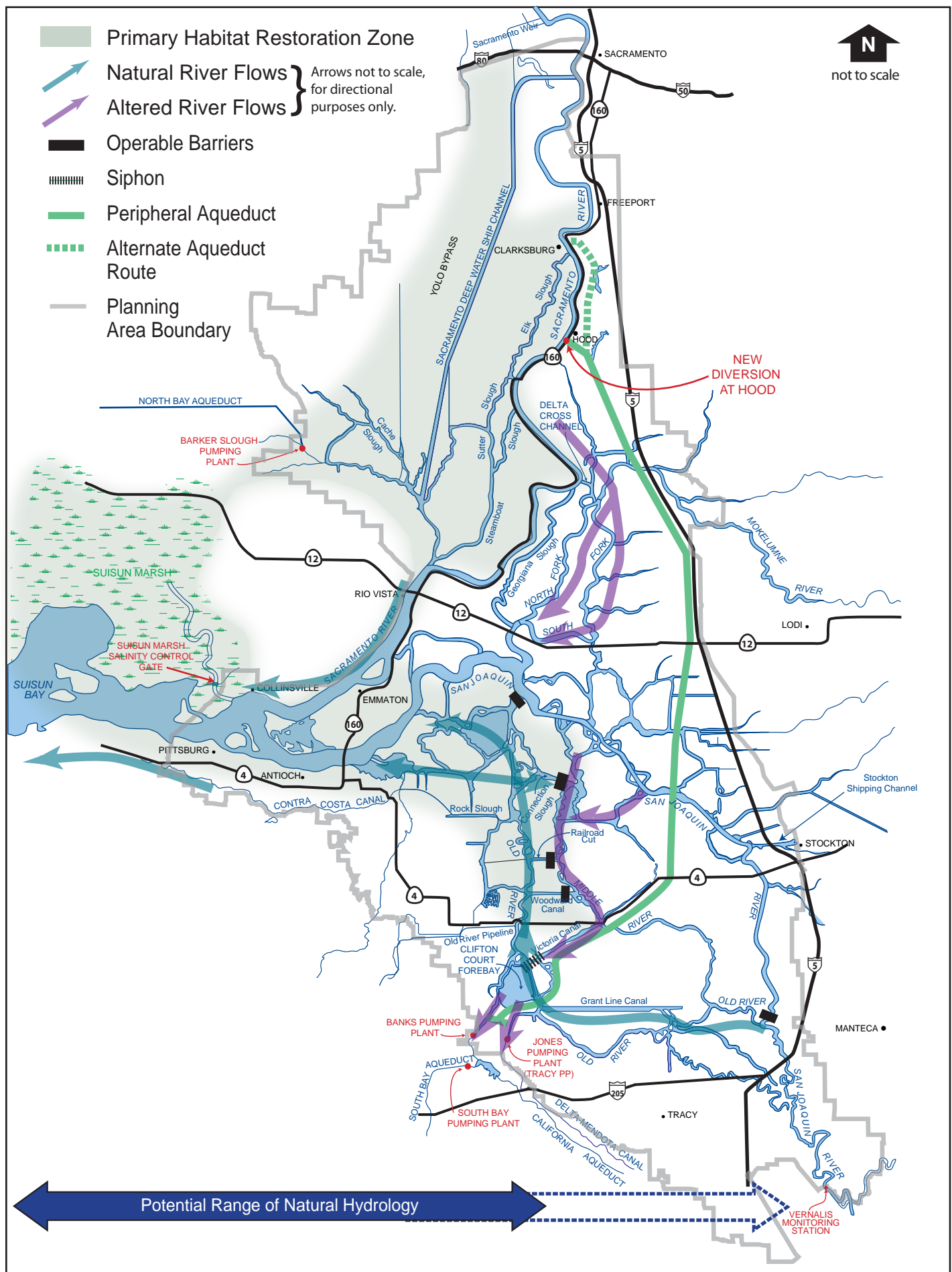


Figure 1-4. Conservation Strategy Option 3

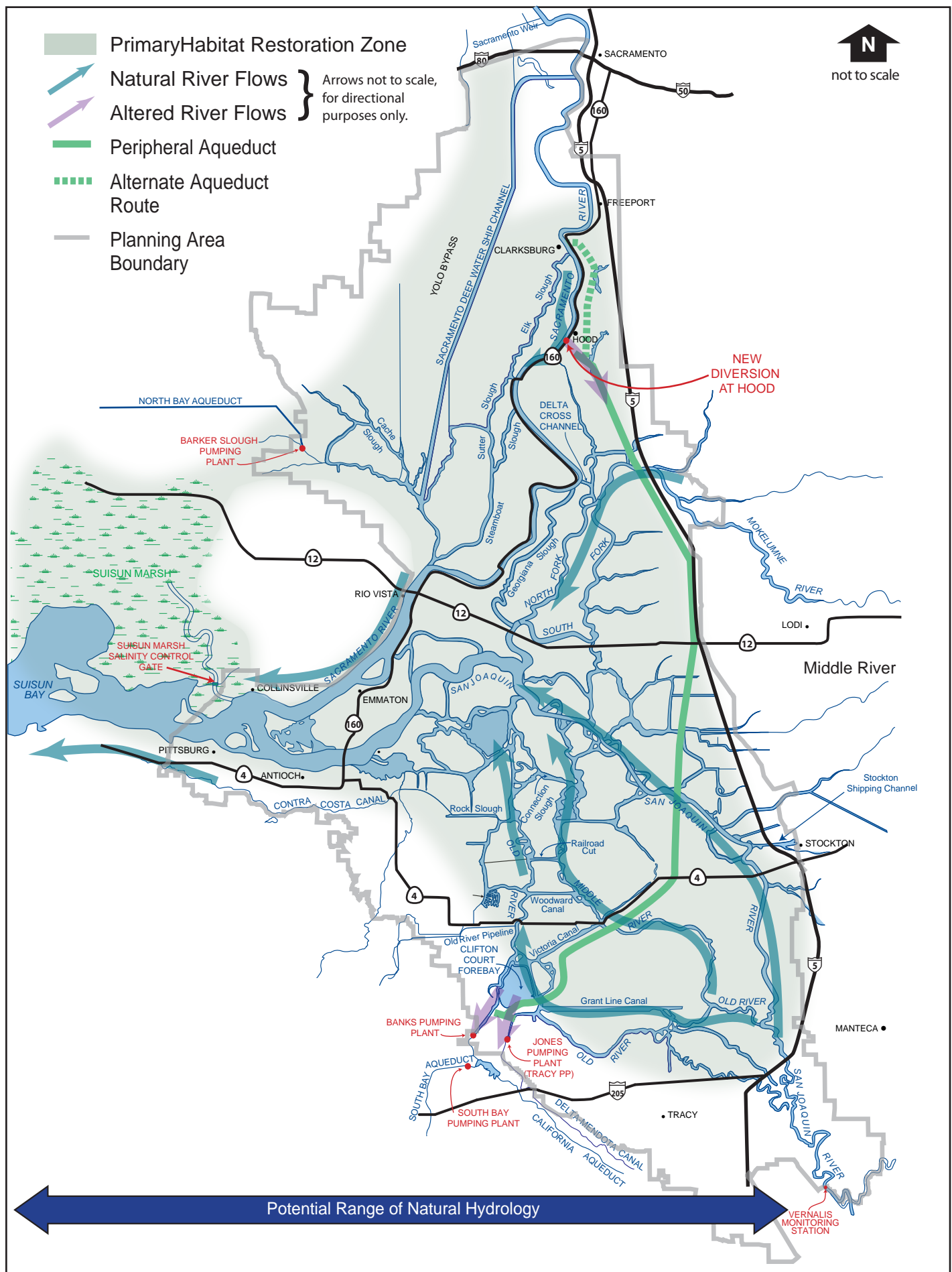


Figure 1-5. Conservation Strategy Option 4